

SYNTAX

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PERSONAL COMPUTERS

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SQ, Spring 83, is coming in February. If you have not subscribed yet--do it now. \$10/4 iss. for SYNTAX subscribers. \$15/4 iss. for non-subscribers.

PROPRIETARY INTERNATIONAL ANNOUNCES ZT21000

A new firm, Proprietary International, just released details of their new co-processor for ZX/TS computers, the ZT21000. About the size of an Apple, ZT21000 offers: 64-key auto-repeat big keyboard, 15 colors, 32K RAM onboard, 3 kinds of sound, 33 new BASIC commands, multiple statement and input lines, 6 video pages, high resolution (192x256 pixels) and animation capabilities, user-definable characters and character sets and up to 9 user-definable functions. ZT21000 has RS232 and parallel interfaces, two Atari-compatible joystick ports and a PROM cartridge port. It saves and loads at 1.5 Kbaud. All this and more, for a target price of \$150-200.

Too good to be true? Some industry observers think so. One told SYNTAX that the components alone would cost \$150 and at \$300 the ZT21000 would still be a good deal.

PI says the ZT21000 will go to the FCC for approval mid-January for release second quarter 83, depending on the manufacturer. For info, send SASE to Proprietary Int'l, 131 LaSalle Rd., Streamwood, IL 60103.

KOPAK CREATIONS OPENS RETAIL STORE

Kopak Creations, a major distributor of ZX/TS-related products, will open a retail store. According to Kopak's Robert Schiller, Computer Discounts is at 119 Peter St., Union City, NJ. Grand opening is early January, but the doors are already open.

SECOND ANNUAL ROSETTA STONE AWARD

Rosetta Stone Award sponsored by Mindware Inc. is for outstanding achievement in ZX/TS hardware or software development. Winner receives a Rosetta Stone replica, \$200 and a one-year subscription to any US journal. Enter by 31 Mar.83. Mindware Inc., 15 Tech Cir., Natick, MA 01760.

NEW PRODUCTS AND SERVICES

Tax Return Helper 1983 helps you fill out form 1040 and schedules A,B,C, C1/C2, D and E. Seven programs perform all computations and detect errors. Print forms or save on tape. \$14 (tax deductible), \$7 for '81 ed. KSOFT, 845 Wellner Rd., Naperville, IL 60540.

CHECK (checkbook), LIST (address book, record keeper), INEX (income-expense sheet), TUTOR (quiz maker), and soon to come INVEN (inventory control) for 16K or more, \$10 each. Tapes verified before shipment. D. Lipinski Software, 2737 Susquehanna Rd., Roslyn, PA 19001.

MULTI-PROGRAM facilities and utilities for 64K or 128K used like disk storage. \$25 US, \$35 international. 64K RAM under \$114, 128K RAM under \$218--add \$4 (P&H). ZX Software Team, Box 560, NY, NY 10005. SASE for info on software, hardware, memberships.

Free catalog and adhesive plastic clip (with instructions) keeps 16K RAM pack from moving. M.C. Hoffman Co., Dept. C/PC, P.O. Box 117, Oakland, NJ 07436.

Run-it software club features business, home, education and entertainment programs at discount prices. Run-it Software Club, Inc., 732 S. Sherman, Chicago, IL 60605 for free catalog.

STARTEXT (local 300-baud videotext service) is available to all home computer users with a modem. \$5 a month for unlimited phone calls to Ft. Worth, TX local number. Joe Donth 817/390-7463, Gerry Barker 390-7832. STARTEXT, P.O. Box 1870, Ft. Worth, TX 76101.

Crash Guard, made of heavy bronze colored acrylic, protects your 16K module from accidental bumping and unplugging. \$10.95, ten day trial

period, satisfaction guaranteed. Expense Cutters Products, Inc., P.O. Box 9543; Raytown, MO 64133.

Attache case holds ZX/TS computer, cassette recorder, 16K RAM module, power pack/cord, and has 2 legal-size file sections in lid. \$34.95, add \$3.50 (P&H) check or MO. Computa-Dek, 6009 Kenwood Dr., Nashville, TN 37215.

International Computer Educational Games Contest is a 3-month competition to develop quality educational software that is informative, imaginative, entertaining and non-violent for all learning levels. Contest has 20 categories, 3 divisions and is open to professionals, teachers, or students. 800/221-4052, in OR 248-6800. Computer EdGame Challenge, P.O. Box 388, Iowa City, IA 52244.

Z-DUBBER interfaces between the ZX/TS and recorder and helps programs load easier. Also, you can connect 2 cassette recorders for backup copies. \$29.95, add 3% (P&H). BYTESIZE Computer Products, P.O. Box 21123, Seattle, WA 98111.

PACE (Project for Adult College Education) in Chicago offers 4-course data processing sequence that gives a 12-credit hour Certificate in Data Processing from City Colleges of Chicago. First 3 Sinclair based courses start in Jan.--students need access to TS1000. Cook County College Teachers Union, Local 1600, AFT, 312/987-0987.

David Lien's new book, Learning Timex Sinclair BASIC, published by CompuSoft will be available in most computer and book stores at the end of Jan.83. Price: \$14.95.

Computer Continuum's Analog Interface with D/A outputs can connect: voltage-controlled ICs and devices, servo-actuated robotics, display devices such as chart recorders and

crt. With Analog Interface you can synthesize and process signals or control processes. It has built-in reference signals for testing A/D. Use A/D inputs for sample signals in scientific or instrumentation data acquisition applications (oscilloscopes, spectrum analysis). Assembled board and manual, \$230; ZX81 mounting (vertical mount with connector, fingers, mounting strap, feet and RAM pack stabilizer) parts, \$15; assembled, \$20; aluminum box, mounting hardware, ribbon cable and connector (unassembled), \$15. Computer Continuum, 301-16th Ave., San Francisco, CA 94118, 415/752-6294.

With "DAL" disassembler (8K/16K) you can check Sinclair's code in ROM, or your own code in RAM. DAL displays each address, decimal and hex values, assembler mnemonics they represent, and disassembles all 812 opcodes directly with no external table lookups. Machine language loader/reviewer routine built-in. Test load program precedes disassembler for adjusting level. Tape, instructions and list of 812 opcodes and mnemonics for \$9. Martin Irons, 46 Magic Circle Dr., Goshen, NY 10924.

Galvanic Skin Response Device (alias biofeedback/lie detector) relays relaxed or stressed states. Wired and tested GSR unit (electrodes attach to fingers) \$19.95; program \$3. Digitalker speaks what's on your screen (A/D unit, control module and GSR required). Four seconds of speech with special 16K program, talk longer with more RAM, \$99.95 (add 5% for P&H, CA residents add 6%). Rose Aircraft, 269 Dahlia I.B. CA 92032.

If you've been waiting for your free issue of ZX newsletter, wait no more. Charles Durang, editor, tells us that ZX newsletter will not see print. Instead he will work on ZX/TS books for Reston Publishing Company.

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USERS' GROUPS

Check our latest list of new users' groups to find one in your area. To check for a local group not listed, drop us a line (include SASE) or give us a call.

Chesapeake, Norfolk, Virginia

Beach, VA: John Bowden, 1001 Trestman Ave., Virginia Beach, VA 23464, 804/421-8330 or 424-7341.

Clackamas County, OR: Portland, OR/Vancouver, WA area ZX/TS users. Bob Evans, 2615 SE Courtney Rd., #19, Milwaukie, OR 97222, 503/659-9207 or Dennis Jurries 655-9670.

Cranbury, NJ: TS1000 Users' Group, Michael Volk, 91 Princeton Arms W., Cranbury, NJ 08512. Eves & wkends: 609/443-4032 or 393-2149.

Denver, CO: Colorado ZX/TS1000 Users' Group, Mike McClure, 211 E. Ellsworth, Denver, CO 80209.

Houston (West), TX: Timex/Sinclair Users' Group, David C. Bonner, 13327 Rain Lilly Ln., Houston, TX 77083, SASE for details.

Oakland, CA: Ward Herring, 440 Grand Ave., Suite 415, Oakland, CA 94610, 415/839-7821.

Penn Yan, NY: Sinclair Group--Yates County, 6 Main St., Penn Yan, NY 14527.

Roanoke, VA: Roanoke Area ZX/TS Users' Group, Richard McGlothlin, Box 1165, Roanoke, VA 24011, 703/981-0749.

Salem, OR: Jeff Helsacken, 3435 1/2 Portland Rd NE, Salem OR 97303.

Santa Maria, CA: Leo Valley, 2703 Banyan Way, Santa Maria, CA 93455, 805/937-9490.

Spokane, WA: E.J. Nolan, E. 1003 Rockwell, Spokane, WA 99207.

Tampa, FL: Timesync Users' Group, Jerry Redman, Steven Singer, 3901 Darwin Ave., Tampa, FL 33603, 813/223-4757 or 977-1150 after 5pm.

Worcester, MA: Charles Kline, 115 Francis Ave., Shrewsbury, MA 01545, 617/842-4163.

PROGRAM IMPROVEMENTS/REFINEMENTS

In Robert Nappi's Star Hunter (Nov.82) delete lines 80 and 90 and insert:

```
88 LET A=A-1*(A>0)+(INKEY$="Z")
  #2*(A<21)
```

This lets one key (Z) control both up and down cannon. Material inside parentheses is analyzed for truth value 1 or 0.

Paul Ezra, San Diego, CA

Composer, part of ZX81 Home Computer Package from Lamo-Lem (reviewed Nov.82), can be better "tuned up" by POKEing the following values during a BREAK and SAVE: POKE 16586,19 and POKE 16587,17.

Arthur Hunkins, Greensboro, NC

In line 570 of Solar Program (Nov.82), delete some spaces to conserve room.

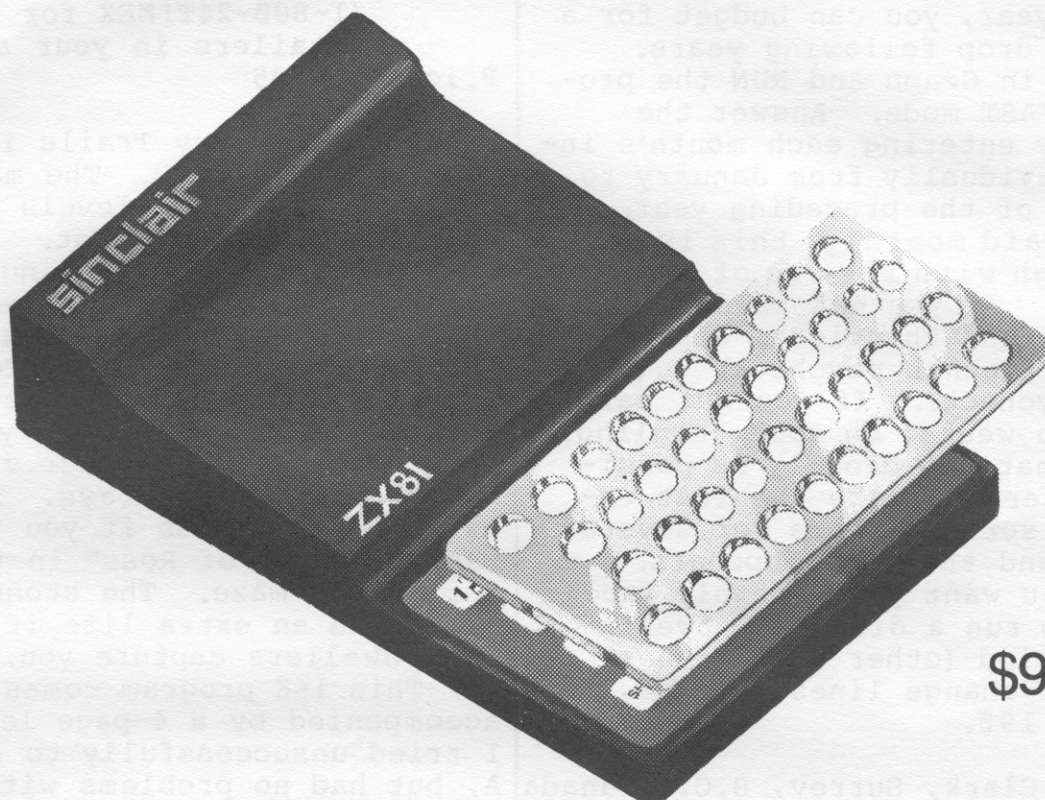
Ed Battenhoff, Grand Rapids, MN

SYNTAX ERRORS: In David Rowland's Etching (Nov.82) line 380 should read: 380 LET X=X-1

ZX81 Home Computer Package (reviewed Nov.82) requires only 1K and is compatible with the ZX81, TS1000 and ZX80 with 8K ROM. The programs are listable.

In Solar Program for Flat Plate Collectors (Nov.82) line 7 of paragraph 2 should read: "summer or equalize heat throughout the year. For 90 degree tilt (vertical), add 20% for months of snow cover."

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MONTHLY INCOME GRAPH--8K/1K

This program creates a monthly income graph for a year. It lets you see which months your income rises and which months it falls. Monthly income graphs are useful in budget planning and if your income varies according to the season (e.g., tourist-related industry). If your income drops at a certain time of year, you can budget for a similar drop following years.

Type in Graph and RUN the program in FAST mode. Answer the prompt by entering each month's income individually from January to December of the preceding year. If you get paid monthly, this is simple enough with the use of your pay slips. If you get paid on the fifteenth and thirtieth, enter a total (fifteenth paycheck) + (thirtieth paycheck). If you get paid every two weeks, do some juggling, and estimate as closely as possible. After you make the last entry, the screen blanks for several seconds and the graph appears.

If you want your monthly income report to run a different twelve-month period (other than January to December) change lines 10, 170, 180, and 190.

Harold Clark, Surrey, B.C., Canada

```
10 PRINT "LOAD EACH MONTHS PAY
: JAN-DEC"
20 LET Z=12
30 DIM M(Z)
40 LET H=0
50 FOR A=1 TO Z
60 INPUT M(A)
70 IF M(A)>H THEN LET H=M(A)
80 NEXT A
90 CLS
100 LET D=H/19
110 FOR A=1 TO Z
120 PRINT INT (H+D-(A*D))
130 NEXT A
140 FOR A=1 TO Z
150 PLOT A*4+7, (M(A)*38)/H+5
160 NEXT A
170 PRINT AT 19,5;"J F M A M J
J A S O N D"
180 PRINT TAB 5;"A E A P A U L
U E C O E"
190 PRINT TAB 5;"N B R R Y N Y
G P T U C"
200 STOP
SYNTACTIC SUM: 21030, 8K ROM
```

SOFTWARE REVIEW

Product: Grimm's Fairy Trails
ROM/RAM required? 8K/16K
Printed listings? No
Program listable? No
Easy to load? OK
Written in: BASIC/Machine Code
Display: Very good
From: Timex Computer Corp.
Waterbury, CT
(1-800-24TIMEX for
retailers in your area).
Price: \$14.95

Grimm's Fairy Trails is Timex's response to PACMAN. The maze-pursuit game has 6 levels of play, from crawl to very fast.

You accumulate winning points as "Young Prince, Billy" moves through the maze gathering B-Lers found along maze paths. To win, you must get all 250 B-Lers before Maze-dwellers catch you.

You move in the maze via the 5,6,7, and 8 arrow keys. You get extra bonus points if you touch the sacred "Stone of Ross" in the center of the maze. The stone also gives you an extra life if the Maze-dwellers capture you.

This 16K program comes on tape accompanied by a 4-page leaflet. I tried unsuccessfully to load side A, but had no problems with side B. Loading takes 3 minutes and 50 seconds, as advertised. The instructions and the displayed introduction are adequate.

After a few games I found it easy to get caught up in the lively action--many enjoyable hours can be spent with Grimm's Fairy Trails.

H.R. Maxwell, West Palm Beach, FL

(David Leigh of Stockton, CA adds, "The program contains PRINT statements in BASIC....but the actual play is in machine code which provides some fast graphics. On speed 1 you can travel the length of the screen, without skipping spaces, in about 1.7 seconds."--Ed)

CONVERTING DECIMALS TO FLOATING POINT BINARY

Some of you may be interested in Sinclair's 5-byte floating point binary representation, if for no other reason than knowing how they do it. The following procedure demonstrates conversion of decimal numbers to floating point binary. For example, convert 325 decimal to floating point:

- 1) Convert the decimal number to binary: $325 = 101000101$
- 2) The number of binary bits plus 128 equals the first floating point byte, the exponent byte:

number of bits = 9; $9 + 128 = 137$

- 3) Set the most significant bit (MSB) to 0 and divide the number into nibbles (4 bits = 1 nibble), filling in 0s at the least significant byte (LSB) position to complete any partial nibble:

$001000101 = 0010\ 0010\ 1000$

- 4) Convert each nibble to hexadecimal and then convert the hex to decimal, filling in 0s as needed to complete conversion to hexadecimal (remember, you need two nibbles to make one hex number):

$0010\ 0010\ 1000\ 0000 = 22\ 80\ \text{hex}$
 $= 34\ 128\ \text{dec.}$

- 5) Add 0s to make 5 bytes:
 $325\ \text{decimal} = 137\ 34\ 128\ 0\ 0\ \text{in Sinclair floating point.}$

Convert 6524:

- 1) $6524 = 1100101111100$
- 2) 13 bits, $13 + 128 = 141$ (exponent)
- 3) $1100\ 1011\ 1110\ 0000$
- 4) 22 80 hex, 75 224 decimal
- 5) $6524 = 141\ 75\ 224\ 0\ 0$

John Bowden, Virginia Beach, VA

(This method works only for positive integers.--EO)

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1005	Demolisher		10/95	
1006	Air Attack		10/95	
1007	Guard the President		10/95	
1008	Combo PAK I		14/50	
1009	Combo PAK II		14/50	
1010	Combo PAK III		14/50	
1011	Submarine		10/95	
1012	Combo PAK IV		14/50	
P001	Memopak 16 K RAM		59.95	
P002	Memopak 32 K RAM		109.95	
P003	Memopak 64 K RAM		179.95	
All Programs require 16K RAM			Sub Total	
*Defective tapes will be replaced, if returned within 3 days.			*5% Mass. Tax	
*Please allow 2 weeks for delivery.			TOTAL	
*Your order may be sent in more than one shipment.			*Mass. Residents Only	
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Signature _____ ☐ VISA ☐ MasterCard				
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HARDWARE REVIEW

Product: BB-1 8-Bit
Input/Output Module Kit
From: Byte-Back Company, Rt 3,
Box 147, Brodie Road
Leesville, S.C. 29070
Price: \$69 assembled and tested
\$59 kit (plus \$4.95 P&H)

Two inexpensive Intel 8212 8-bit I/O port chips are the heart of the BB-1. (See SYNTAX, Jan.81, for design and ZX80 use of this chip.) Byte-Back's module is compatible with both ZX and Timex units and neatly uses memory locations 32764 and 32766 to store input and output information. Reportedly, the unit can be used with or without various memory modules--it internally decodes its port addresses and produces a phony MREQ which prevents real memory locations 32764,5,6 and 7 from being accessed (RAMTOP becomes 32763).

BB-1 extends the ZX/TS bus for

use with a memory pack or printer. Yet, the extension edge connector is out the bottom of the card and makes an awkward system set-up. To hook up external devices, connect them to buffered I/O lines and attach 0.156" 44-pin edge connector to the top of a vertically mounted board. The BB-1 module comes with 8 output relays rated at 200 VDC and 0.75 Amp but the documentation warns against using these directly on 110 volt appliances. When building the kit, it's a good idea not to install 4 of the relays right away--output can directly drive some TTL loads without the need for mechanical parts.

Kit documentation is comprehensive and straight-forward. However, I would have liked more extensive documentation on input devices including a parts list for photocell input, and setup for a joystick port.

BB-1 comes with its own 500 mA, 9V supply (required to drive the relays) and 7805 regulator. Using an extra power supply is inconvenient and the lack of a case detracts from what is otherwise a professionally designed double-sided board.

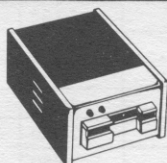
I used the inputs with an open collector photo-cell and push buttons with success--the relays easily switch AC power to low power devices such as a portable tape recorder, or 40 watt lamp. Contact life on the relays is limited and external power relays are recommended for heavier loads.

Overall, the system performs as advertised and provides an excellent basis for an energy management system, home protection system or general household controller.

Paul Donnelly, Centerport, NY

(Byte-Back informs us that if you use BB-1 to control lights or with other energy-saving devices, you get a tax credit on the total cost of your whole system.--Ed)

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- Second drive easily added for greater flexibility.
- For T/S 1000, ZX-81 and ZX-80.

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*Requires CAI/O Board for interface **\$69.95**

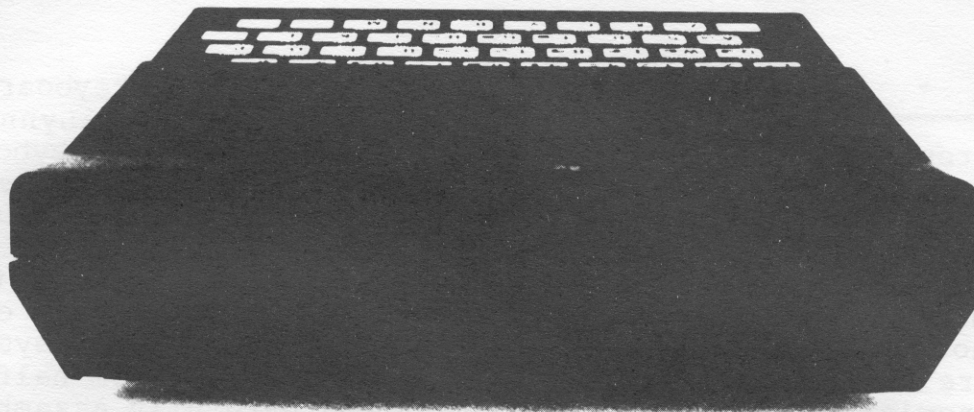
Order by phone or mail. Check, money order, VISA or MasterCard (include number and exp. date). Post. in U.S. \$5

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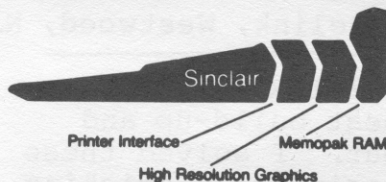
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BEHIND EVERY GOOD SINCLAIR IS A MEMOPAK

If you own a Timex-Sinclair 1000 or ZX81 computer, you should have a Memopak behind it. From increased memory to high resolution graphics, Memotech has a Memopak to boost your system's capabilities. Every Memopak peripheral comes in a black anodised aluminum case and is designed to fit together in "piggy back" fashion to enable you to continue to add on and still keep an integrated system look.



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Memopak 32K RAM The 32K RAM Memopak offers your Sinclair a full 32K of directly addressable RAM. Like the 64K Memopak, it is neither switched nor paged and enables you to execute sophisticated programs and store large data bases. It is also fully compatible with Sinclair's or Memotech's 16K RAM to give you a full 48K of RAM.

Memopak 16K RAM The Memopak 16K RAM provides an economical way to increase the capabilities of your Sinclair. And at the same time, it enables you to continue to add on other features with its "piggy back" connectors. It is compatible with the Sinclair 16K or a second Memopak 16K or Memopak 32K to give 32K or 48K of RAM respectively.

Memopak High Resolution Graphics The Memopak HRG contains a 2K EPROM monitor and is fully programmable for high resolution graphics. The HRG provides for up to 192 by 248 pixel resolution.

Memopak Printer Interface The memotech centronics parallel or RS232 printer interface paks enable your Sinclair to use a wide range of compatible printers (major manufacturers' printers available through Memotech at significant savings). The resident software in the units gives the ASCII set of characters. Both Memopak printer interfaces provide lower case character capabilities. The RS232 Interface is also compatible with modems.

New products coming soon Memotech will soon be introducing four new Sinclair compatible products: a high quality, direct connection keyboard, a digitizing tablet, a 16K EPROM and a disk drive. Watch for our future advertisements.

Mail to: Memotech Corporation, 7550 West Yale Ave., Denver, CO 80227			
Code: STX-2	*Price	Qty	Total
64K RAM	\$179.95		
32K RAM	109.95		
16K RAM	59.95		
Centronics Parallel Printer Interface	104.95		
RS232 Printer Interface	139.95		
High Resolution Graphics	144.95		
Shipping and handling	4.95		\$4.95
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DEAR EDITOR

In reference to MD-1 Direct-Connect Modem and RS-232 Port hardware review in Nov.82, baud rate is not the number of bits per second transferred to a modem. In low speed modems, the two are normally equal but not synonymous.

There are 3 types of modulation used in transmitting data--frequency, amplitude and phase shift. The first two work as they do in radio, varying either a given amount to represent zero or one.

Phase shifting involves shifting the wave form 180 degrees from the reference point to indicate a one and allowing the wave to continue normally through a 360 degree cycle to indicate zero.

High speed modems generally use combinations of these modulation types. This is done so that the line signal need change less frequently to represent a like amount of data: the definition of "baud" is the number of signal changes occurring in one second.

If the signal changes once for each bit of data, then the baud rate equals the "bits per second." If the signal changes once for every three bits of data, then the baud rate equals the "bits per second"/3.

John Nawrocki, Cincinnati, OH

Since modems communicate with their terminals via standard RS232 serial signals, and RS232 uses one signal change per bit, the baud rate on the RS232 cable will always be 10 times characters per second.

Common 300-baud modems use one signal change per bit over the telephone line as well. Higher speed modems (such as 1200 baud) may actually transmit a baud rate below 1200 to the telephone line. However, the data that is transmitted from the terminal to the modem remains 1200 baud, by any definition.--EO

I purchased a keyboard from John J. Meshna in E. Lynn, MA, part #SPL-19 to make the keyboard conversion for my ZX81. The supplied keys were single pole, but had room for another pole.

Since more keys exist on the keyboard than I need, I carefully took apart the extra keys, removed the reed switch from half the extra keys and carefully assembled the reeds in the remaining units to make double pole switches.

One pole of each I wired to the shift key and the other pole to keys that are frequently used such as the = sign, THEN, DELETE, etc. Now I don't have to press the shift key to obtain these operations. The only requirement is to check with an ohmmeter (before the switch is wired) which contact closes first. Wire this contact to the shift key.

This change makes the keyboard easier to use. Of course, you should mark the new keys with only the single operation or function they represent.

Al Frielink, Westwood, NJ

My ZX81 with 16K RAM had a problem with heat build-up and program drop-out. I solved these problems by placing self-sticking feet on the underside of the computer case. My equipment has now been running for two months without any return of problems.

Alex Bartlett, San Francisco, CA

Will a ZX80 with 8K ROM be compatible with the new telephone modem to be sold by Timex? If so, will it preclude or require the video upgrade kit?

George Peterson, Bellevue, WA

Timex's new modem will not likely work with upgraded ZX80s because they lack SLOW mode. Computer Engineering Services has been mar-

keting a video upgrade board for ZX80s to add SLOW mode, but it only works with the early 8K ROM that contained the PAUSE bug.--EO

If I have the renumbering program (Jun.82) on tape and another program on tape--how do I get both of them into the computer from separate tapes so one can be renumbered using the renumbering program? Also, is there any way to get the cursor to the end of a line being edited in one step? When the edited line is long, it takes many shift 8s to correct an error.

John Carlson, Phoenix, AZ

The BASIC line renumbering program (Jun.82, improved Aug.82) must be loaded before you start typing in any program to renumber, since it is really just a part of your BASIC program. We know of no way to move directly to the end of the line, but a repeat key (available on some commercial keyboards) helps.--EO

I am trying to write a program to convert data coming out of the cassette ports to ASCII. I've been told this data is coded. Can you provide any information about the format of the code?

Bob Billson, Westfield, NJ

Conversion to ASCII must take place prior to outputting through the cassette port thus the code used to save programs on tape is unimportant. The simplest way to get ASCII out the cassette port is to generate standard modem frequencies (2025 and 2225 Hz) in machine code and feed them through an audio amp to a modem. Do ASCII translation in machine code in ZX/TS RAM.--EO

I installed the 16K RAM inside the ZX81 case because I got tired of the floppy edge connector. I put the edge connector half of the RAM circuit board under the Z80

processor and ROM after removing the edge connector (edge connector side to the rear), and the other CB under the keyboard with the capacitors snug against the keyboard ribbon connectors (this board had to be trimmed a bit opposite the capacitors). I wired the 2 boards together and to the ZX81 male connector contacts, routing these through the rear of the case. Everything just fit without eliminating any screw anchors. The project took 8 hours but the result is a more compact 16K ZX81 which can be hand-held more comfortably.

Jon Passler, Beverly, MA

I have noticed that when I have the computer on for a few hours, the keyboard locks out--no further key entries accepted. I found only one way to clear the computer--unplug and replug it, losing all previously entered material. Is this a normal glitch due to heat, etc.? Is there something I can do to prevent its reoccurrence?

Dave Agee, Upper Marlboro, MD

If your computer locks up with characters on the screen, suspect an overheating problem. Feel the case above the 1 key; it should not be hotter than a solid-state TV. If you lose the TV picture, suspect a loose RAM or power connector. Physically securing them from wiggling will prevent wiggling will cure periodic crashes. Use tape, Velcro fasteners, or extra support under your RAM.--EO

Is there any way you can interface an IBM Selectric II to a ZX81 with 16K RAM?

C.M. Broecken, Grand Rapids, MI

Interface a Selectric II to any computer using one of the commercially available solenoid key-pushers or Centronics-compatible

baseplates. Then get a matching interface for your ZX81. For instance, a Kogyosha KGS80 keypusher accepts signals from a Memotech Centronics interface, converting a Selectric II into a printer.--EO

Problems of poor heat dissipation in my ZX81 were simply and cheaply solved by the use of Heat Sink Grease (\$1.29, Radio Shack #276-1372).

Remove the case from the circuit board; detach heat sink by removing the mounting bolt from voltage regulator (VR); spread a liberal amount of compound on the sink where it contacts the VR and remount the heat sink. Don't allow the grease (a mixture of silicon and zinc oxide) to contact the pins on the VR or other board elements.

My ZX81 runs much cooler with no evidence of excess heat after 7 hours operation.

William Tracy, Donelson, TN

HARDWARE REVIEW

Product: Speech Pack
By: D.C.P. Microdevelopments
From: Gladstone Electronics
1585 Kenmore Ave.,
Buffalo, NY 14217 or 1736
Ave. Rd., Toronto M5M 3Y7
Price: \$119.95

Speech Pack gives you computer-generated speech through your ZX/TS. Speech Pack is a black box with a special processor and ROM containing words. It has three other sockets so other word ROMs can plug in. Speech Pack does not obstruct other ZX/TS add-ons--a printed circuit board edge is provided on back of Speech Pack. If you want to connect an external amplifier, a 3.5mm jack plug socket is provided (it is the same size as the tape leads, so words can even be recorded on tape).

Speech Pack is memory-mapped in two RAM locations (49149 and 49148) and is simply POKEd with the number of the 16-bit word required. Include a PAUSE before the next word is spoken to give the processor time to output.

The word may be any one of 72 included in the first ROM (provided with SP). With the extra available ROMs you can get up to 249 words.

Most of the words are measurements, such as a complete set of numbers in the first ROM from zero to a million. The first ROM contains the alphabet, including Zee for Z (as opposed to Zed). Because the processor stops talking as soon as you POKE another word, you can create new words by shortening spoken words. But only word beginnings can be used in this way.

Speech Pack's voice is clear with sufficient volume for a single user. It's easy to use and entertaining---part of the challenge is finding out how many other words you can create.

Stephen Adams, London, UK

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CHECKS



BOOK REVIEW

Title: Byteing Deeper Into Your
Timex/Sinclair 1000

By: Mark Harrison

From: John Wiley & Sons, Inc.
605 Third Ave.
New York, NY 10158

Price: \$12.95

Byteing Deeper is clear and easy to understand, unlike many books which claim to instruct but consist mainly of programs. It takes you step-by-step through capabilities and limitations of ZX/TS BASIC. Harrison explains all BASIC functions one at a time and uses them in short programs to give you working examples.

Some chapter topics include: The Principles of a Computer System, The Formation of Algorithms, Statements, ZX81 Memory, Peeking and Poking, Programming Techniques, Using INKEY\$, and Projects for Readers.

This book explains in detail what the ZX81 Manual forgot to do, for example: how to program efficiently and conserve valuable memory space especially if you don't have 16K.

Byteing Deeper briefly covers Machine Language programming and shows how to use mathematical and logical functions. Harrison also explains how to convert other dialects of more common BASICs for use on the ZX81 (i.e. LEFT\$, RIGHT\$, MID\$, TL\$, READ, DATA and RESTORE).

One section contains 37 programs that progress from simple to advanced programming. Some programs include: The Black Hole, One Armed Bandit, and Invaders.

As a novice programmer, I found this book instructive, and well detailed. I recommend it especially for beginners. All included programs can be used with 8K ROM and 1K RAM.

Anthony Musco, Glendale, NY

CHASE--8K/1K

In Chase you avoid the snake by moving tokens with 4 cursor control keys. Chase ends and prints your score when the snake catches you or you accumulate 100 points.

Chase lays out the playing field and randomly selects starting positions. To move, you must press and hold the cursor arrow keys. Don't worry about error messages if you go off the screen; lines 180 and 190 contain logic expressions that prevent this.

Lines 210 and 220 control the snake's movement. Since the snake can move diagonally and you cannot, divisions by 2 are necessary to slow him down enough to give you a sporting chance. Line 240 tests the screen to determine if the snake has caught you.

When entering the program, be sure to use quote image, shifted Q, in line 140. If you run Chase on a 1K ZX81, there is not enough room to check Syntactic Sum.

To play Chase, RUN and ENTER and to stop hit BREAK.

James Waskowich, Quaker Hill, CT

```
10 REM "CHASE"
20 LET A=INT (RND*62)+1
30 LET B=INT (RND*41)+1
40 LET C=INT (RND*62)+1
50 LET D=INT (RND*41)+1
60 FOR N=0 TO 63
70 PLOT N,0
80 PLOT N,42
90 NEXT N
100 FOR N=42 TO 0 STEP -1
110 PLOT 0,N
120 PLOT 63,N
130 NEXT N
140 PRINT AT 0,12;"""CHASE""""
150 FOR N=1 TO 499
160 LET K$=INKEY$
170 UNPLOT A,B
180 LET A=A+(K$="8")*(A<62)-(K$="5")*(A>1)
190 LET B=B+(K$="7")*(B<41)-(K$="6")*(B>1)
200 PLOT A,B
210 LET C=C+(C<A)-(C>A)/2
220 LET D=D+(D<B)/2-(D>B)
230 PLOT C,D
240 IF A=C AND B=D THEN GOTO 26
0
250 NEXT N
260 PRINT AT 0,11;"GAME OVER"
270 PRINT TAB 6;"YOUR SCORE IS,";N/5
SYNTACTIC SUM: 33242, 8K ROM
```

SINKING FUND--8K/16K

How much money do you need to save each month to have a certain sum accumulated at a certain time? That is a sinking fund calculation. For simple calculations, any business-type calculator will do. But Sinking Fund offers more features and saves repetitive key-pushing.

You can input up to 12 payouts, 10 single investments and 4 given monthly investment amounts. The program then calculates monthly investments to balance the stream of investments and payouts.

Start the program with RUN. Lines 1210-1820 provide prompts and load provided data into arrays. Within each section of input data (i.e. single investment, monthly payment and payout) you must make entries in date order from first to last. Note in line 1250 there is no space between TO and EXIT to straighten the display left margin.

Lines 150-1130 do all computation in FAST mode. This is an iterative calculation with trial monthly investments to find a balance. Trial runs with 12 payouts, a single investment and one monthly investment took 80-90 seconds.

Lines 470, 940 and 1110 recompute the trial monthly investment for a new trial amount.

The program is set to consider $\pm \$100$ balance at the end close enough to stop the iteration. If you want more or less precision just change 100 in lines 1100-1130 to whatever you want. To get more entries in one category, change the proper DIM statement and the proper FOR-NEXT loop (the A array holds single investment data, the B array added monthly investments and the C array the payouts).

Exercise caution inputting data; I did not program in error traps. You could easily PRINT the values in the arrays as a check on correct data entries.

Russell Crum, Canton, MI

```

10 REM SINKING FUND PROGRAM
20 REM R. CRUM JULY 1, 1982
30 DIM A(10,3)
40 DIM B(4,3)
50 DIM C(12,3)
60 DIM E(2)
70 LET B=0
80 LET C=0
90 LET D=0
100 LET E=0
110 LET Y=0
120 GOTO 1210
130 REM FIRST PAY OUT
140 FAST
150 LET F=C(1,2)
160 LET H=C(1,1)
170 IF B=0 THEN GOTO 280
180 FOR N=1 TO B
190 LET I=A(N,2)
200 LET J=A(N,1)
210 IF I>F THEN GOTO 280
220 IF I=F AND J>H THEN GOTO 28
230 LET K=(F-I)*12+(H-J)
240 LET L=A(N,3)
250 GOSUB 1030
260 LET Y=Y+Z
270 NEXT N
280 REM ADDITIONAL MONTHLY INVE
290 IF C=0 THEN GOTO 400
300 FOR N=1 TO C
310 LET I=B(N,2)
320 LET J=B(N,1)
330 IF I>F THEN GOTO 400
340 IF I=F AND J>H THEN GOTO 40
350 LET K=(F-I)*12+(H-J)
360 LET L=B(N,3)
370 GOSUB 1060
380 LET Y=Y+Z
390 NEXT N
400 REM MONTHLY INVEST OF M
410 LET Q=E(1)
420 LET R=E(2)
430 LET K=(F-R)*12+(H-Q)
440 LET Z=M*((1+R)*K-1)/R
450 LET Y=Y+Z
460 LET X=Y-C(1,3)
470 IF X<0 THEN LET M=M-(X/((C(
D,2)-R)*12+(C(D,1)-Q)))
480 IF X<0 THEN LET Y=0
490 IF X<0 THEN GOTO 130
500 LET S=D-1
510 LET P=2
520 IF S=0 THEN GOTO 1090
530 REM NEXT PAY INT
540 LET E=C(P,2)
550 LET G=C(P,1)
560 LET L=X
570 LET K=(E-F)*12+(G-H)
580 GOSUB 1030
590 LET Y=Z
600 IF B=0 THEN GOTO 730
610 FOR N=1 TO B
620 LET I=A(N,2)
630 LET J=A(N,1)
640 IF I>E THEN GOTO 730
650 IF I<F THEN GOTO 720
660 IF I=F AND J<=H THEN GOTO 7
670 IF I=E AND J>G THEN GOTO 73
680 LET L=A(N,3)
690 LET K=(E-I)*12+(G-J)
700 GOSUB 1030
710 LET Y=Y+Z
720 NEXT N
730 IF C=0 THEN GOTO 900

```



```

740 FOR N=1 TO C
750 LET I=B(N,2)
760 LET J=B(N,1)
770 IF I>E THEN GOTO 900
780 IF I=E AND J>G THEN GOTO 90
0
790 IF I<F THEN LET L=B(N,3)
800 IF I<F THEN LET K=(E-F)*12+
(G-H)
810 IF I<F THEN GOTO 870
820 IF I=F AND J<=H THEN LET L=
B(N,3)
830 IF I=F AND J<=H THEN LET K=
(E-F)*12+(G-H)
840 IF I=F AND J<=H THEN GOTO 8
70
850 LET K=(E-I)*12+(G-J)
860 LET L=B(N,3)
870 GOSUB 1050
880 LET Y=Y+Z
890 NEXT N
900 LET K=(E-F)*12+(G-H)
910 LET Z=M*(((1+A)**K-1)/A)
920 LET Y=Y+Z
930 LET X=Y-C(P,3)
940 IF X<0 THEN LET M=M-(X/((C(
D,2)-R)*12+(C(D,1)-Q)))
950 IF X<0 THEN LET Y=0
960 IF X<0 THEN GOTO 130
970 LET F=E
980 LET H=G
990 LET S=S-1
1000 LET P=P+1
1010 IF S=0 THEN GOTO 1090
1020 GOTO 530
1030 REM SINGLE SUM INTEREST
1040 LET Z=L*((1+A)**K)
1050 RETURN
1060 REM ANNUITY INVESTMENT
1070 LET Z=L*((1+A)**K-1)/A
1080 RETURN
1090 REM ENDING
1100 IF X>100 AND M<1 THEN GOTO
1180
1110 IF X>100 OR X<-100 THEN LET
M=M-(X/((C(D,2)-R)*12+(C(D,1)-Q
)))
1120 IF X>100 OR X<-100 THEN LET
Y=0
1130 IF X>100 OR X<-100 THEN GOT
O 130
1140 SLOW
1150 PRINT "$";M;" MONTHLY REQUI
RED"
1160 PRINT "BALANCE AT END IS $"
;X
1170 STOP
1180 PRINT "NO ADDITIONAL MONTHL
Y INVESTMENT READ"
1190 PRINT "BALANCE AT END IS $"
;X
1200 STOP
1210 PRINT "THIS PROGRAM COMPUTE
S MONTHLY"
1220 PRINT "INVESTMENT NEEDED TO
PROVIDE UP TO TWELVE PAYOUTS. U
P TO TEN"
1230 PRINT "SINGLE INVESTMENTS M
AY BE"
1240 PRINT "PROGRAMMED AND 4 ADD
ITIONAL"
1250 PRINT "MONTHLY INVESTMENTS.
ADDITIONAL MONTHLY INVESTMENTS
ARE ASSUMED TO CONTINUE TO THE L
AST PAYMENT SCHEDULED. PRESS""0"
"AND""ENTER"" TOEXIT A PARTICULAR
SECTION OF THE"
1260 PRINT "PROGRAM"

```

```

1270 PAUSE 1500
1280 CLS
1290 PRINT AT 0,0;"MO. TO START
CALC?(2 DIGITS)"
1300 INPUT E(1)
1310 PRINT AT 0,29;E(1)
1320 PRINT AT 2,0;"YR. TO START
CALC?(4 DIGITS)"
1330 INPUT E(2)
1340 PRINT AT 2,28;E(2)
1345 PAUSE 250
1350 FOR N=1 TO 10
1355 CLS
1360 PRINT "SINGLE INVEST NO.";N
;" MO.(2 DIGITS)"
1370 INPUT A(N,1)
1380 PRINT A(N,1)
1390 IF A(N,1)=0 THEN GOTO 1480
1400 PRINT "SINGLE INVEST NO.";N
;" YR.(4 DIGITS)"
1410 INPUT A(N,2)
1420 PRINT A(N,2)
1430 PRINT "SINGLE INV.NO.";N;"
AMT(6 DIG.MAX)"
1440 INPUT A(N,3)
1450 PRINT A(N,3)
1455 PAUSE 250
1460 LET B=N
1470 NEXT N
1480 FOR N=1 TO 4
1485 CLS
1490 PRINT "MO.INV.NO.";N;" MO.B
EGIN(2 DIGITS)"
1500 INPUT B(N,1)
1510 PRINT B(N,1)
1520 IF B(N,1)=0 THEN GOTO 1610
1530 PRINT "MO.INV.NO.";N;" YR B
EGIN(4 DIGITS)"
1540 INPUT B(N,2)
1550 PRINT B(N,2)
1560 PRINT "MO.INV.NO";N;" AMT(6
DIGITS MAX)"
1570 INPUT B(N,3)
1580 PRINT B(N,3)
1585 PAUSE 250
1590 LET C=N
1600 NEXT N
1610 FOR N=1 TO 12
1615 CLS
1620 PRINT "PMT NO.";N;" MO.(2 D
IGITS)"
1630 INPUT C(N,1)
1640 PRINT C(N,1)
1650 IF C(N,1)=0 THEN GOTO 1740
1660 PRINT "PMT NO.";N;" YR.(4 D
IGITS)"
1670 INPUT C(N,2)
1680 PRINT C(N,2)
1690 PRINT "PMT NO.";N;" AMT(6 D
IGITS MAX)"
1700 INPUT C(N,3)
1710 PRINT C(N,3)
1715 PAUSE 250
1720 LET D=N
1730 NEXT N
1740 PAUSE 1000
1750 CLS
1760 PRINT AT 0,0;"ASSUMED INTER
EST RATE/YR?"
1770 PRINT AT 1,0;"E.G. 10=10 PE
R CENT"
1780 INPUT A
1790 LET A=A/1200
1800 LET M=100
1810 CLS
1820 GOTO 130
SYNTACTIC SUM: 60157, 8K ROM

```

TONE GENERATOR

You can generate tones on your ZX/TS by building this circuit and using a machine code routine with it connected. The hardware memory maps from 32K to 64K. Any address that turns on A15 strobes the 4013 D-flip flop. Output of the 4013 drives an audio amplifier. The capacitor, resistor and diode connected to 4013 reset it on powerup.

```

1 REM .....
.....
.....
10 FOR I=1 TO 141
20 INPUT A
30 POKE 16513+I,A
40 SCROLL
50 PRINT 16513+I,PEEK (16513+I
60 NEXT I

```

RUN this program and enter the numbers from Table 1 one at a time. After the program stops, delete all lines except 1.

TIMEX-SINCLAIR
ZX81 1000



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Table 1

042	041	064	017	005	000	025	034	013
065	042	013	065	205	224	064	200	237
083	011	065	205	224	064	200	237	083
009	065	034	013	065	001	000	000	042
011	065	229	084	093	025	025	017	025
000	025	235	042	009	065	003	175	237
082	242	181	064	087	225	229	050	255
255	043	124	181	032	251	205	070	015
210	166	003	122	214	001	087	121	222
000	079	120	222	000	071	177	178	032
224	193	024	172	126	254	118	200	214
028	023	023	023	023	230	240	087	035
126	214	028	178	087	035	126	214	028
023	023	023	023	230	240	095	035	126
214	028	179	095	035	035	246	001	201
000	000	000	000	000	000	000		

To use the tone generator call USR 16514. Put the tones and their lengths in a REM statement right after the USR call. Tone and duration are both four digit hex numbers and any number of pairs may be used. Experiment to determine what numbers give desired durations.

```

1 REM EDNRND) ;6$INKEY$E$INKE
Y$LN STEP RND COS GOSUB ?"INKEY$L
N STEP RND COS GOSUB ?"INKEY$6$IN
KEY$ E"INKEY$ FAST ?";);); FO
R E"INKEY$ GOSUB ? PAUSE RND?
LPRINT FAST M COPY COPY F?4 CL
$ LN ??ABS ?CHR$ ?? THEN ??
THEN ?4 STEP AT /0**** NEW LI
ST ?? NEW LIST ??? PLOT *TAN

```

```

2 FAST
10 RAND USR 16514
20 REM 0079 0300 0045 0300 005
D 0100 0061 0100 006D 0100 003D
0300 0051 0300 005D 0100 0061 01
00 006D 0100 003D 0300 0051 0300
005D 0100 0061 0100 005D 0100 0
06D 0300.
SYNTACTIC SUM: 20138, 8K ROM

```

The numbers must be in pairs (4 digit tone, space, 4 digit duration) and must be separated by spaces. A period must be at the end of the line.

Use this table for a specific note's tone number (be sure to add two leading zeros for 4 digits):

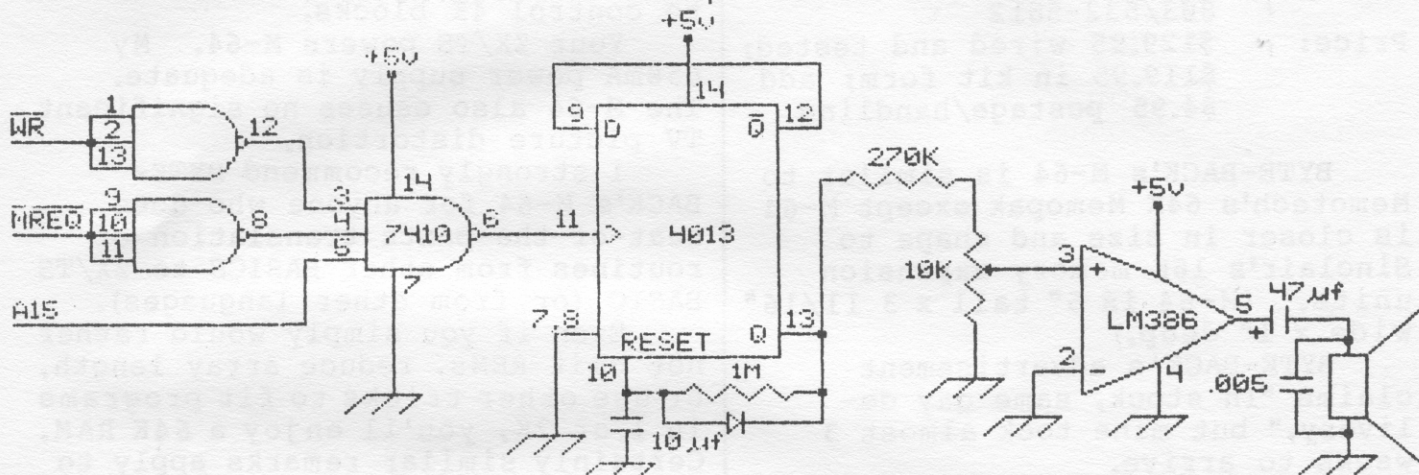
C	F1	F#	B1	C	79	F#	59	C	3D	F#	2C
C#	E1	G	A1	C#	71	G	51	C#	39	G	29
D	D9	G#	99	D	6D	G#	4D	D	37	G#	27
D#	D1	A	91	D#	69	A	49	D#	35	A	25
E	C1	A#	89	E	61	A#	45	E	31	A#	23
F	B9	B	81	F	5D	B	41	F	2F	B	21

If you would like to try the routine without building the circuit, listen through the record jack by plugging in an audio amplifier or by recording on tape and playing back. You will hear noise when the tones are not being gen-

erated. Change the USR routine as follows to listen this way:

POKE 16575,0
POKE 16576,211

Nels Anderson, Framingham, MA



Use these fingers on the ZX81 edge connector:

WR: 17A MREQ: 14A A15: 11B +5V: 1B GROUND: 4B

"IF I HAD TO CHOOSE JUST ONE PROGRAM TO IMPRESS AN AUDIENCE, THEN '3D MONSTER MAZE' WOULD BE THE ONE"*

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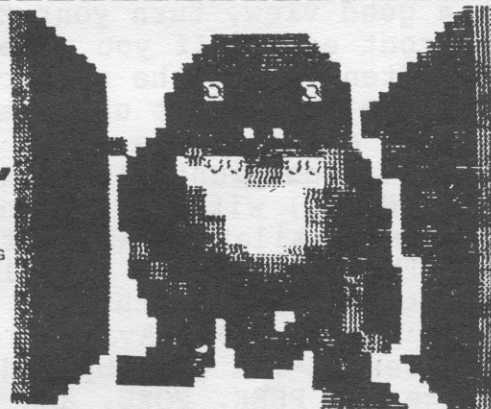
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STX 1

HARDWARE REVIEW

Product: BYTE-BACK M-64, Memory Expansion
From: BYTE-BACK Co., Rt 3, Box 147, Brodie Rd.
Leesville, SC 29070
803/532-5812
Price: \$129.95 wired and tested;
\$119.95 in kit form; add
\$4.95 postage/handling

BYTE-BACK's M-64 is similar to Memotech's 64K Memopak except M-64 is closer in size and shape to Sinclair's 16K memory expansion units. (M-64 is 5" tall x 3 11/16" wide x 1" deep.)

BYTE-BACK's advertisement claims "In stock, same day delivery," but mine took almost 3 weeks to arrive.

You plug M-64 into the expansion port in back of the ZX/TS leaving duplicate expansion capability for other I/O devices. Take care installing M-64, to assure complete edge adaptor seating. To get a good view, turn your ZX/TS on its front edge. If you move the pair often, check the connection each time to prevent unnecessary glitches and problems.

M-64 uses eight 64K RAMs (Motorola MCM6665) with addressing logic to expand available RAM to full 64K. The lower 8K is disabled to prevent conflicts with ROM, leaving 56K of usable RAM. Available RAM addresses 8K-16K give byte data storage via PEEK, POKE, and USR routines, and USR routines may be located here. This portion of memory is neither SAVED nor LOADED, or altered in those processes. This allows USR routine program-to-program communication in linked program execution. RAM addresses 16K-32K are available for BASIC programs and data, for USR routines and byte data storage. 32K-64K RAM addresses are available for BASIC variables and POKEing byte data.

Since Sinclair's ROM assumes no more than 16K RAM, you must POKE

64K into RAMTOP and execute NEW.

RAM addresses 8K-16K are removable for subsequent hardware and software purposes in 2K increments by cutting designated, accessible straps on M-64. For comparison, the Memopak 64 uses switches to control 4K blocks.

Your ZX/TS powers M-64. My 650mA power supply is adequate. The M-64 also causes no significant TV picture distortion.

I strongly recommend BYTE-BACK's M-64 for anyone who does seat-of-the-pants translation of routines from other BASICS to ZX/TS BASIC (or from other languages).

Even if you simply would rather not omit REMs, reduce array length, or use other tricks to fit programs in 1 or 2K, you'll enjoy a 64K RAM. Certainly similar remarks apply to Memotech's 64K Memopak, but M-64 costs \$50 less. No programmer should be without one.

Roy A. Chardon, Albuquerque, NM

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